FINAL REPORT ON THE AREA PLANTED TO GM MAIZE IN SOUTH AFRICA FOR THE 2007/2008 SEASON

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The author wishes to extend his appreciation to the Maize Trust for having provided the funds for this survey and to all collaborators -- specifically the biotech seed companies -- for having submitted confidential data and inputs.

1. EXECUTIVE SUMMARY

The study has a primary objective to survey and analyze GM (genetically modified) maize production in order to serve as a database for stakeholder parties ranging from seed suppliers to producers, silo owners, grain traders, millers, food industry, consumers, and government departments. Such information may be required for imports and exports, as well as serving local markets that may have special requirements.

The survey is based on analyzing actual seed sales data provided on a confidential basis by seed companies, calculating the hectares planted according to seeding rates for different regions, and expressing GM areas in terms of percentages of total area planted as estimated by the Crop Estimates Committee. It covers analyses by GM trait separately for white and yellow maize. The survey goes through three stages: estimates based on seed orders and intention to plant, final seed sales and CEC estimated area under maize, and final analyses to reconcile seed industry inputs on seeding rates and total market estimates.

Global GM crop plantings increased by 12% to reach 114.3 million hectares, grown by 12 million farmers in 23 countries. An additional 29 countries have approved use of GM products for feed or food. The cumulative hectares under GM crops over 11 years stand at 690 million hectares. Approvals cover 124 genetic modifications in 23 crops. Soybean remains the major GM crop and herbicide tolerance the major trait. Farmer benefits from 1996 to 2006 totalled US$34 billion and reduced pesticide use by some 289 000 MT a.i.

South Africa still ranks 8th in the world with 1.8 million hectares combined of the three crops: maize, soybeans and cotton. Total GM maize came to 1.562 million hectares, 0.975 million white and 0.587 million yellow, with share of the total planting at 56% for total maize, 56% for white and 55% for yellow. Part of the increase was due to 9% increase in maize area over the previous season. Nevertheless, white maize increases its market share by 8% and yellow by 25%, Insect resistance accounted for 71%, herbicide tolerance for 24% and stacked traits for 5% of total GM area. Cumulatively, total GM maize area from 2000 to 2008 covered 4.492 million hectares and produced a grain yield of over 15 million MT, the 10.6% average yield benefit of which was estimated at some R2 billion at farm gate prices.

A rough estimate of GM maize farmers indicated that about 4 000 – 5 000 commercial farmers plant GM maize. Less information was available on subsistence, smallholders and emergent farmers. Responses from three companies indicated that about 10 500 out of 46 500 of these planted GM maize or 23% of farmers.

The difference between SANSOR estimates of GM seed market share and my survey was investigated and discussed with seed companies. The major reason

was identified as the former being based on seed volumes and the latter on hectares planted using seeding rates and seed counts, coupled with a possible overestimate of total market by SANSOR.

Analysis of permits approved during 2007 for GMOs showed that maize permits accounted for 91% of the 379 total. GM grain imports numbered 223 permits with a total of 1.9 million MT but it does not imply that all permits were used in the volume or the time period indicated. GM seed imports were 1196 MT and exports 1509 MT. Other GM seed imports and exports were for trials, seed multiplication or contained use evaluation.

An incidence of apparent resistance in stalk borer larvae to GM maize with the Bt gene was reported by the ARC-GCI. This indicates the need for a stronger effort in monitoring fields and follow-up research to ascertain resistance and application of measures to counteract or delay such resistance mechanisms to develop.

Regulatory developments include creation of a Directorate for Biosafety in the Department of Agriculture which will include administering the GMO Act, appointment of a Director of Biosafety, appointment of a new GMO Registrar, creation of a section within the SA National Biodiversity Institute to monitor GMO impact on biodiversity, and discussions in the GMO Executive Council on handling stacked gene applications and applications for grain imports that may contain unapproved genetic events.

A media release on GM crop adoption globally and in South Africa received wide coverage locally and internationally.

Finally, some 4.5 million hectares of GM maize were grown over the past nine years, all without any substantiated incidence of damage to human or animal health, or to the environment. This is evidence of a biosafety framework that helps to ensure assessment of safety of GM products prior to approval for commercial release, and compliance by biotech stakeholders with regulations.

2. INTRODUCTION

The objective of the study was to survey and analyze adoption of genetically modified (GM) maize by producers in South Africa in order to establish an updated database on GM plantings, available to maize industry stakeholders as a source of information. This would preclude confusion that may result from conflicting data being distributed by various parties. It would also enable traders in maize grain and products to convey information to trading partners as may be required by customers domestically and in other countries, and to comply with the Cartagena Protocol on Biosafety.

Beneficiaries of this information include the following parties and their clients or colleagues:

AgriSA, GrainSA, grain traders, millers, silo industry, industrial processors, food and animal feed manufacturers and their clients, seed industry, CEC, SAGIS, SAGL, National Department of Agriculture, ARC, the GMO Secretariat, Executive Council, Advisory Committee, and the media.

Data in this report are based on reliable confidential statistics provided by biotechnology seed companies and cover hectares of GM maize planted and percentage of market with a breakdown per trait -- insect resistant (IR) or herbicide tolerant (HT) and stacked genes (IR/HR) -- shown separately for white and yellow maize, as well as historic data since 2000/2001 in order to highlight trends. An analysis of permits granted during 2007 is also included as maize seed and grain imports and exports that are GM or may contain material of GM origin have trade relevance for the industry. Statistics are based on commercial maize plantings as official data on subsistence farming are at best unreliable guesstimates and as most planting is based on farm-saved seed and the crops are consumed on-farm. Some information is included on sale of GM maize seed to the smallholder farming sector.

3. METHODOLOGY AND APPROACH USED IN SURVEY

The survey goes through three stages so that information is refined with latest information available at each stage. Seed companies provide a breakdown of seed sales per GM trait (Bt insect resistance, glyphosate herbicide tolerance, and stacked genes for both traits), per white and yellow maize, and per seed density used (6-8 kg/ha for drier Western and Northern regions, 10-12 kg/ha for Eastern and South-Eastern regions, and 20-25 kg/ha for irrigation farming. Seed is mostly sold on seed count basis in pockets containing 60 000 or 80 000 seeds and these are converted to kg. In fact, seed count gives a more accurate picture of area planted to a pocket than kg as

the seeds per kg vary from 2 500 to 3 500, depending upon seed size and shape.

It was not possible to survey areas planted to GM maize per CEC region as each seed company has its own sales regions based on its analysis of agro-ecological parameters and its marketing infrastructure, and they do not record sales per CEC provincial regions. It is interesting that CEC inludes the Loskop scheme with Limpopo and not with Mpumalanga.

The *first estimate* in early November 2007 of GM maize plantings was based on discussions and meetings with six seed companies (Pannar, Pioneer, Monsanto, Link Seed, Syngenta, Agricol, and Afgri) that are marketing GM maize seeds. The total maize area planted (2.8 million hectares) was derived from an average of expectations expressed by seed companies from seed orders and was higher than the Crop Estimates Committee report available at that time on intention to plant maize. In fact, this estimate matched the CEC's April report.

The *second estimate* derived in April-May 2008 made use of confidential company audited seed sales information and the CEC April and May reports on maize area planted and crop yields.

A *third analysis* in May-June was considered necessary in view of the discrepancy between analyses contained in this report and the information contained in the SANSOR annual report. Personal discussions were held with all GM seed companies on seeding rates for all nine CEC regions and for irrigation farming systems, commercial and smallholder maize areas, as well as seed count per kg so as to identify possible reasons for this discrepancy. This round extended into an attempt to ascertain irrigation area planted to maize from which one could estimate GM market share, and into a first attempt at surveying subsistence and emergent maize farming to estimate total farmers involved and GM market share. Time was also spent on informal discussions with officials and visiting the Department of Agriculture website to ascertain updated information on regulatory matters.

4. RESULTS

4.1 Global overview

Annual overviews are compiled by ISAAA (the International Service for the Acquisition of Agri-Biotech Applications), an international non-profit organization. These overviews are released by way of international media conferences and published as Briefs. Other updates are printed in the form of small brochures and updates provided in the form of a weekly e-newsletter. Surveys and studies are executed by independent groups in various countries. Salient points from the 2007 Brief 37 (C. James, 2007,

Brief 37: Global Status of Commercialized Biotech/GM Crops:2007, and available in summary form on www.isaaa.org) are as follows:

- **Global planting of GM crops increased by 12% to reach 114.3 million ha in 2007.**
- **These crops were planted by 12 million farmers in 23 countries, 11 million being smallholder farmers.**
- **Cumulative area under GM crops since 1996 now amounts to 690 million ha.**
- **For 2007, the USA leads with 57.7 million ha, followed by Argentina 19.1, Brazil 15.0, Canada 7.0, India 6.2, China 3.8, Paraguay 2.6, and South Africa with 1.8 million ha. The remaining 15 countries are Uruguay, Philippines, Australia, Spain, Mexico, Colombia, Chile, France, Honduras, Czech Republic, Portugal, Germany, Slovakia, Romania, and Poland.**
- **In addition to the 23 countries growing GM crops, another 29 have approved biotech crops for import as food and feed, and /or for trial planting. These 615 approvals involve 124 genetic modifications in 23 crops.**
- **Soybean remains the major GM crop (58.6 million ha), followed by maize (35.2 million ha, cotton (15 million ha) and canola (5.5 million ha).**
- **The major trait is herbicide tolerance at 63% share of total GM, followed by stacked traits at 19% and insect resistance at 18%.**
- **Cumulative farmer benefits for 1996 -2006 were US$34 billion, and pesticide savings amounted to 289 000 MT active ingredients.**
- **Most growth in adoption now comes from developing countries, driven by Bt cotton in China and India, and soybeans in Brazil.**

The global trends are shown in Annex 5.1…

4.2 South African overview

The final estimate of genetically modified maize (GM) plantings is based on discussions and meetings with seed companies (Pannar, Pioneer, Monsanto, Link Seed, Syngenta, Agricol, and Afgri) that are marketing GM maize seeds. The total maize area planted (2.799 million hectares) is based on the most recent Crop Estimates Committee report available at the time of drafting of this final report.

South Africa retained its 8th ranking on the ISAAA list of biotech crop countries with 1.8 million ha planted in 2007. Genetic modifications approved for commercial release are:

- **1997/8: Bt insect resistance Mon 810, Monsanto**
- **2002: RR glyphosate tolerance NK 603, Monsanto**
- **2003: Bt 11 insect resistance + herbicide tolerance, Syngenta**
- **2007: Bt insect resistance + glyphosate tolerance, Mon810 x NK603, Monsanto.**

Seed companies are in the process of testing hybrids for water use efficiencies. It is of special interest to note that the past season saw the first field trials of a GM drought tolerant maize strain

Sometimes delayed adoption of such traits is due to having the beneficial genes in the appropriate hybrid adapted to South African conditions and to bulking up of seed. The impact of the stacked genes for insect resistance and herbicide tolerance will only become visible as from 2009 to 2010 when seed production is sufficient to replace single gene hybrids. This impact is expected to be substantial.

As regards the survey and analyses of results, it should be explained that the reports to the Maize Trust comprise an interim report based on the first round of the survey, followed by an updated final report that uses final seed sales data. The initial results are used in the ISAAA global report that is released in January-February each year and these results are also provided to the International Grains Council in a cryptic format, as requested by the Department of Agriculture. The year-on-year comparisons in the ISAAA reports are based on first survey data, while those in the final report to the Maize Trust on the final survey data. Historically, the total GM hectares have changed very little from the first to the final survey: in 2006/7 it was 2% higher, and in 2007/8 it was 1% lower in the final report. However, the ratio of GM white and yellow maize adoption, and the shares of the traits differed by more than 2% each year; hence, the differences in percentages of changes.

The analyses expressed as percentages GM, are based of total commercial plantings published by the CEC, as statistics on subsistence and smallholder crops are unreliable.

It has already become evident that GM maize will be the mainstream product and conventional and organic production will remain secondary segments. The first survey, based on seed sales estimates in October-November, indicated that the GM share had moved up by 33% to 1.607 million ha (57% of total), comprising 1.04 million white (62% of white) and 0.567 million yellow (51% of yellow), as contained in the interim report.

These figures were submitted to the ISAAA global report and to the IGC via the Department of Agriculture.

The second survey in May, excluding data on smallholder farmers, required a few adjustments due to slightly lower white GM seed sales and more yellow sales. GM maize for the 2007/8 season stood at 1.562 million ha (56% of total), comprising 0.975 million ha for white (35% of total maize and 56% of white) and 0.587 million ha for yellow (21% of total maize and 55% of yellow). The major trait is Bt insect resistance being 71% per cent of total GM maize, and herbicide tolerance being 24% of total. Stacked traits (insect resistance plus herbicide tolerance) was approved for commercial sales in February 2007 and on 83 300 ha commanded a 5% share of GM ha. The latter trend is expected to grow substantially at the expense of single traits, provided that the combined traits are inserted in locally adapted varieties and sufficient seed is available.

More details are contained in Tables 1 and 2 below and the trend graph is contained on p. 12 in the text.

TABLE 1
TOTAL GM MAIZE CHANGES 2007/8 OVER 2006/7

CLASS	2006/7 HA x1000	2007/8 HA x1000	CHANGE	2006/7 % MKT SHARE	2007/8 % MKT SHARE	CHANGE
WHITE	851	975	+ 15%	52	56	+ 8%
YELLOW	408	587	+ 44%	44	55	+ 25%
TOTAL	1259	1562	+ 24%	49	56	+ 14%

SUMMARY:

- **GM white maize hectares increased by 15%, yellow maize by 44% and total maize by 24% from 2006/7 to 2007/8**
- **GM white maize market share increased by 8%, yellow maize by 25% and total maize by 14% from 2006/7 to 2007/8**
- **NOTE: Changes are based on straight percentages for white and yellow, but weighted on white : yellow market shares for total maize changes.**

TABLE 2:
GM TRAIT MARKET SHARE CHANGES 2007/8 OVER 2006/7

TRAIT	2006/7 HA X	2007/8 HA X	CHANGE	2006/7 % GM	2007/8 % GM	CHANGE

	1000	1000		SHARE	SHARE	
Bt IR	**990**	**1102**	**+ 11%**	**77**	**71**	**- 11%**
HT	**269**	**377**	**+ 40%**	**21**	**24**	**+ 11%**
Bt+HT	**0**	**83**	**-**	**0**	**5**	**-**

SUMMARY:

- **Bt insect resistant maize hectares increased by 11% and herbicide tolerant hectares by 40%.**
- **Stacked traits (Bt IR+ HT) sales commenced in 2007 and achieved 83 300 hectares.**
- **Bt maize market share decreased by 6% from 77% to 71% of total GM maize grown, while HT maize increased by 3% to 24% share.**
- **Stacked traits (Bt + HT) achieved 5% of total GM maize market at the expense of Bt maize.**

Cumulatively, some 4.492 million hectares of GM maize have been planted over the past nine seasons, constituting 2.464 million white ha and 2.028 million yellow ha.

The summarized data over nine years, and a graph, are shown below.

<u>Area planted to GM white maize (IR = Bt insect resistant, HT =herbicide tolerant)</u>

2000: nil
2001: nil
2002: 6 000 ha out of 1.7 mil. ha. = 0.4% of white maize area (all IR)
2003: 60 000 ha out of 2.1 mil.ha. = 2.9% (all IR)
2004: 144 000 ha out of 1.8 mil.ha = 8.0% (all IR, HT negligible)
2005: 147 000 ha out of 1.8 mil.ha = 8.2% (142 000 IR = 7.9% + 5 000 HT= 0.3%)
2006: 281 000 ha out of 1.0 mil.ha = 28.8% (221 000 IR = 22.8% + 60 000 HT = 6.0%)
2007: 851 000 ha out of 1.625 mil. ha = 52.3% (712 000 IR = 43.8%+ 139 000 HT = 8.5%)
2008: 975 000 ha out of 1.737 mill ha = 56% of total white (696 000 IR =40% + 218 000 HT = 13% + 60 000 IR/HT =3%)

Cumulative area planted to GM white maize over nine years = 2.464 mill ha

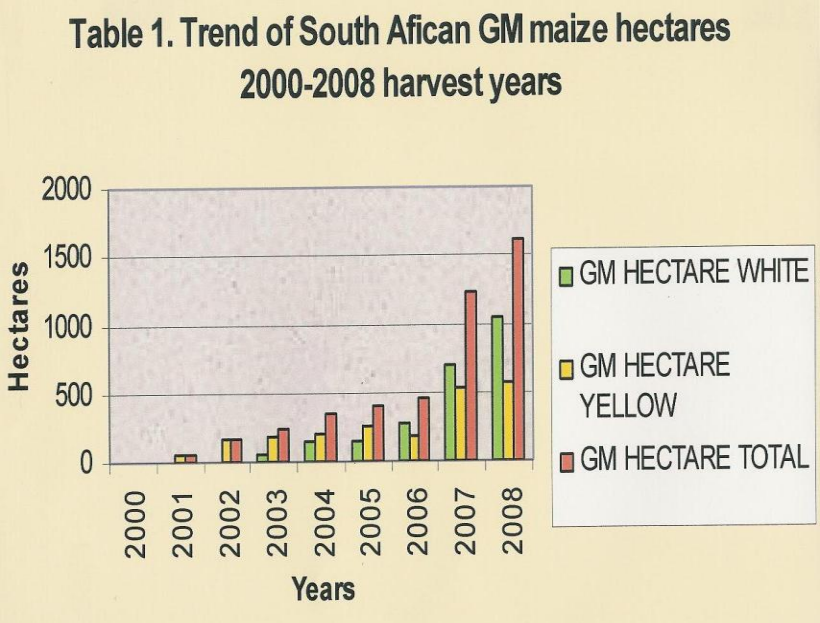
<u>Area planted to GM yellow maize (IR = Bt insect resistance, HT = herbicide tolerant)</u>

2000: 3 000 ha
2001: 59 000 ha
2002: 160 000 ha out of 1.1 mil.ha = 14.5% of yellow maize area (all IR)
2003: 176 000 ha out of 0.9 mil.ha = 19.5% (all IR)
2004: 197 000 ha out of 1.0 mil.ha = 19.7% (all IR, negligible HT)
2005: 263 000ha out of 1.1 mil.ha = 23.9% (249 000 IR= 22.6% + 14 000 HT = 1.3%)
2006: 175 000 ha out of 0.6 mil.ha = 29.0% (107 000 IR= 17.8% + 68 000 HT = 11.3%)
2007: 408 000 ha out of 0.927 mil.ha = 44.0% (391 000 IR= 35.5% + 137 000 HT = 12.5%)
2008: 587 000 ha out of 1.06 mill ha = 55% of total yellow (406 000 IR = 38% + 159 000 HT = 15% + 23 000 IR/HT = 2%)
Cumulative GM yellow maize area over nine years = 2.028 mil.ha

<u>Total GM maize area planted over nine years (*harvest seasons)</u>

2000: 3 000 ha
2001: 59 000 ha
2002: 166 000 ha
2003: 236 000 ha
2004: 341 000 ha
2005: 410 000 ha
2006: 456 000 ha
2007: 1.259 mil. ha
2008: 1.562 mill ha

Cumulative GM maize area planted over six years = 4.492 mil.ha.



4.3 Farmer profiles

As there are no official data on maize farmer numbers available and not all maize farmers produce maize every season, an estimation of farmer numbers is a bit of a guess. Seed companies agree with a figure of between 7 000 and 8 000 large-scale commercial farmers. While some farmers plant only GM maize (discounting the mandatory conventional refuge areas) and others plant both GM and conventional, it is estimated that the between 4 000 and 5 000 commercial farmers plant GM maize.

The number of smallholder maize farmers was more difficult to establish as there were no clear data on numbers of subsistence, smallholder and emergent farmers in South Africa and as seed companies do not maintain accurate records on each farmer who procure conventional or GM seed. Some seed is sold by distributors, some seed is supplied to municipalities, projects, or agri-development groups and the end user is not identified, and some buyers share seed with neighbours or members of their farmers' association. Company information was requested from GM seed suppliers: three responded and another indicated that they serve minimal smallholders directly but some direct sales may end up with communities or small-scale farmers. The data obtained were discussed with the three respondents (only one provided a breakdown by seed pocket size) who provided information on conventional and GM volumes, and analyzed on the following assumptions:

- **Buyers of 2, 5. and 10 kg pockets are household and subsistence farmers**

- **Those that buy pockets of 25 kg (or 60 000, 80 000 or 100 000 seed count) are smallholders and emergent farmers, and buy 1.3 pockets on average to plant 3 ha.**
- **Buyers of yellow maize seed are mostly emergent commercial farmers and where basic services provided by the seed supplier include ploughing, crop management, mentorship and harvesting, and the average emergent commercial farm size is estimated at 4 ha.**
- **White maize seed sales to farming areas where most of the maize is consumed or marketed fresh, with an average purchase of 25kg of seed.**

Based on these assumptions it was estimated that a total of 46 500 farmers were reached by the three companies, of whom 10 500 planted GM maize or 23% of total. Total sales amounted to 1 111 MT of which 337 MT was GM. In terms of surface area, GM covered approximately 33 700 Ha. This analysis is based on respondents' data and there may be much more information from other seed companies, development groups and agri-businesses. The analysis is based in respondents' data and information from other companies will contribute to a more complete picture.

The majority of smallholder maize farmers surveyed by the University of Pretoria in KZN who plant a GM variety or varieties (albeit Bt, RR or Stacked) also plant other maize seed including the conventional isoline, other conventional hybrids from other seed companies or the same, some open pollinated varieties and almost everyone still planted a small plot to traditional varieties, with the latter usually earmarked for chicken feed.

4.4 SANSOR GM crop data

The 2007/2008 SANSOR annual report indicated that the domestic maize seed market for the 2007 planting season was 33 776 MT and the GM share was 42%. The size of this difference with analyses done in collaboration with seed companies, based on their audited sales data, was larger than in the past and an investigation was considered necessary. Individual discussions, therefore, were held with representatives of all biotech seed companies and the reasons for the differences were identified as follows:

- **My analyses have historically been based only on adoption of GM maize by the commercial sector as reliable data on area planted and seed used by subsistence and smallholder farmers have not been available to date. The latter sector contributes only 2.5% of the national crop.**
- **My data are based on area planted while that from SANSOR on seed sales. The area was derived from plant density and seed count for the different agro-ecological regions, and not on seed volumes alone.**

These scenarios for the CEC nine provinces were discussed with seed companies and all agreed that the seed count and planting densities were correct.

- **SANSOR data may contain an under-estimate of GM as some biotech company financial year ends in December while my data cover the season to end February.**
- **The Northern Cape irrigation and Eastern Mpumulanga regions have some areas devoted to non-GM to serve local special industrial or export markets. It should be noted that the Free State and North-West provinces, having low seeding rates of 6-8 kg/ha, account for 75% of total white area, yielding 68% of total white maize, and for yellow 61% and 49%, respectively.**
- **All seed companies agreed that the total commercial seed market is about 27 500 MT, showing a national average seeding rate of just below 10 kg/ha with a minor variation between estimates. Not all of the 498 000 ha under smallholder planting (CEC estimate, June 2008) is served by the formal sector. The general estimate is about 50%.**
- **Thus, the SANSOR estimate of the domestic seed market is too high and may contain some elements of double sales and sales that move across border.**

Taking the above variables into account, seed companies agreed that my calculations still present the best estimate to date.

4.5 South Africa added value of Bt maize

The total volume of GM maize produced from harvest year 2000 to 2008 amounts to over 15.0 million MT, 7.4 being white and 7.6 yellow. Comparisons of added seed cost versus benefit of herbicide tolerance benefits showed that the net effect over two years, two regions and irrigation and dry-land, is about the same. Therefore, only the benefit of Bt insect resistance was analyzed (single Bt and combined Bt/HT), using an average dry-land yield increase of 10.6% (University of Pretoria studies). Average farm gate prices were obtained from official statistics. The commercial value is estimated at almost R20 billion, and the added value of 10.6% yield benefit estimated at about R2 billion over these nine years.

The analysis is contained in the Annex 5.2

4.6 Analysis of GMO maize permits

Some 379 permits were approved during the calendar year January to December 2007. As regards imports of commodity maize, the information summarized below will not harmonize with that of SAGIS; firstly, as a

permit granted does not imply that the permit will be used for imports or in the quantities or specified time requested; secondly, as the permits apply to the date approved in the calendar year and not for execution in a marketing period.

The different types of permits and approvals are contained in Annex 5.3

The permit analysis is summarized as follows:

- **Maize accounted for 91% or 345 permits out of 379 issued**
- **GM maize grain imports numbered 223 involving 1.9 million MT, all grain coming from Argentina**
- **No permits were issued for GM grain exports.**
- **70 Permits applied for seed imports; 11 amounting to 1196 MT for sale as planting seed estimated at a cost of R40 million to make up shortfalls in local supplies, and another 59 for small shipments intended for breeding, multiplication, trials, and re-export.**
- **Seed export permits covered 7 permits for 1509 MT commercial seed at an estimated value of R55 million. The balance of GM seed exports were small samples for breeding, multiplication, trials, or contained use research.**

4.7 Incidence of potential stalk borer resistance to Bt maize

It is inevitable that some degree of resistance to Bt genes may develop, as has been the case with pest and disease resistance developed through conventional breeding. Likewise, the case of pest resistance to chemical insecticides—pyrethrum is at present fairly ineffective and pest resistance to some 500 chemicals have been recorded. However, the Bt bio-pesticide as spray and inserted gene has had a unique track record of persistent efficacy over 60 years. Only one substantiated case is on record (although experts do not always agree), namely that of diamond black moth in covered cabbage production sprayed with high doses of Bt toxin. Efficacy of the Bt gene has never been 100% but estimated at about 97%. Counteracting potential resistance has been based on using different Bt genes individually or stacked, and mandatory planting of conventional maize adjacent to Bt fields to serve as refugia.

The identification by Prof Koos van Rensburg, ARC-GCI, of resistant larvae in isolated cases of Bt maize plantings under irrigation in the Christiana area has indicated that resistance could break down under certain cultural practices. This investigation is being continued in collaboration with biotech seed companies.

4.8 Regulatory developments

The GMO Act is comprehensive and its scope covers all genetic modification technologies, as defined, on all organisms, from registration of facilities where GMO work is done to application on-farm. Approval for GMO activities is based on a permit system. The extent of these permits and policies is contained in Annex 5.3.

Salient points of new regulatory developments can be summarized as follows:

- **The GMO Act 15 of 1997 has been amended in 2007 to include improved wording in several definitions, addition of the Department of Arts & Culture and the Department of Water Affairs & Forestry in the composition of the Executive Council; to specify two members of the Advisory Committee (one an ecologist and one a human and animal health expert); to include wording to ensure compliance with the Cartagena Protocol on Biosafety; inserting more details pertaining to environmental safety; and some general improvements of texts. The President has signed approval of the Bill into an Amended Act.**
- **GMO Regulations have been amended as a draft to harmonize with the Amended Act and have been widely circulated for comments. Several amendments have been pointed out as being problematic and my inputs have been copied to the Maize Trust. The Act will enter into force once these regulations have been approved and only then will representatives of the Departments of Arts & Culture and Water Affairs & Forestry be appointed to the Executive Council.**
- **Ms Chantal Arendse has been appointed as Director: Biosafety in the Directorate of Plant Production, Health and Quality, responsible for the GMO Act (after the responsibility had been moved from the Directorate of Genetic Resources). Ms Gillian Christies was appointed in May as Registrar of GMOs. The S A National Biodiversity Institute (SANBI, comprising Kirstenbosch Botanical Gardens and the Botanical Research Institute) has been charged with various functions under the Biodiversity Act and Ms Tsepang Makholela has been appointed to manage impact of GMOs on biodiversity. Part of their mandate is to develop post-release monitoring protocols. Personal meetings have been held with these three officials.**
- **The issue of evaluating and regulating GMOs with stacked genes was delegated by the Executive Council to the Department of Environment & Tourism to develop a draft policy document on ecological risk assessment for staked genes. It is not clear why this assignment was not given to the scientific Advisory Committee. To date DEAT has not yet produced this document. It remains also unclear why stacked genes should be subjected**

to other assessments when the individual genes have already passed through biosafety approval.

- **Uncertainties on commodity clearance for genetic events not yet approved for commercial release in South Africa has led to a temporary moratorium on such maize grain imports. To date the maize grain industry, in terms of the planned contingency grain plan, has not yet submitted documents on the plan. It should be noted that Argentina has recently approved a new maize modification: TC1507 x NK603 that combines tolerance to glufosinate-ammonium with resistance to *Diatraea* sugarcane borer and to *Spodoptera* fall army worm, plus moderate resistance to *Heliothis* earworm. The Department of Trade& Industry is aware of practical and logistical constraints, apart from adequate oversight by the Department of Agriculture, when such grain imports are to be milled before distribution.**
- **The GMO Executive Council has entered into discussions with the Medicines Control Council in the Department of Health on the process for approval of GM vaccines (such as HIV/AIDS and TB) and pharmaceuticals. To date, the MCC made these decisions on its own, contrary to provisions in the GMO Act.**
- **The Consumer Rights Bill drafted by the Department Trade & Industry, made provision for mandatory labeling of all foods and their ingredients/derivatives from GM plants. The third revised draft excludes this paragraph but it seems that anti-GM lobbyists, supported by some parliamentarians, are pushing for comprehensive GM labeling. Members of the GMO Executive Council have taken note of the immense costs of compliance and verification of such legislation. Lack of food and feed industries to speak up and to support the identity preservation systems for non-GM products leaves the lobby field open to activism.**

4.9 Media coverage

ISAAA media releases include simultaneous media conferences held in February 2008 in some 20 major cities globally, a weekly crop biotech update newsletter distributed to over 600 000 recipients, and many interviews held by their chairman and regional representatives. In all, several hundred million persons were reached in this way. South Africa featured prominently in both the executive summary and in the complete report.

A media conference arranged in Pretoria by Hans Lombard PR in collaboration with myself, tied in with the global release of the ISAAA Brief 37 on global status of GM crops. Mr Lourie Bosman, AgriSA President, was guest speaker and Ms Hanfie Neuhoff of the SA Women's Agricultural Union gave a presentation as second speaker. The key South African GM crop data were combined with global data.

Media coverage in South Africa amounted to:

13 newspapers, 5 magazines, 4 radio stations and one hour on RSG, plus news items on web sites, calculated at having reached at least 5 million listeners and readers. Presentations were also given at the bi-annual SA Plant Breeders Symposium in March, the FANRPAN Stakeholders Meeting in June and other events while other articles appeared in printed media at a later stage.

No further media releases are planned

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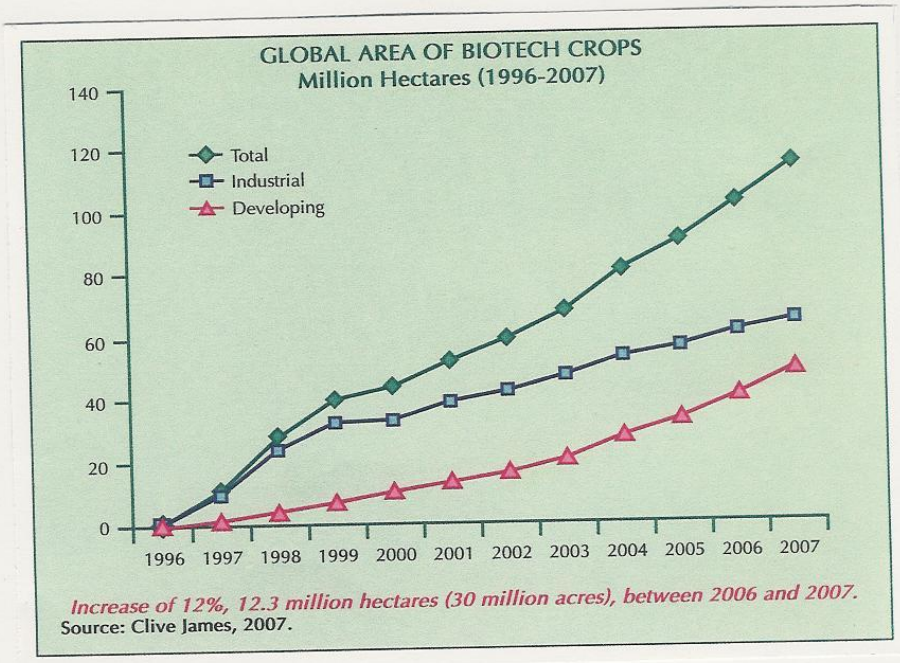
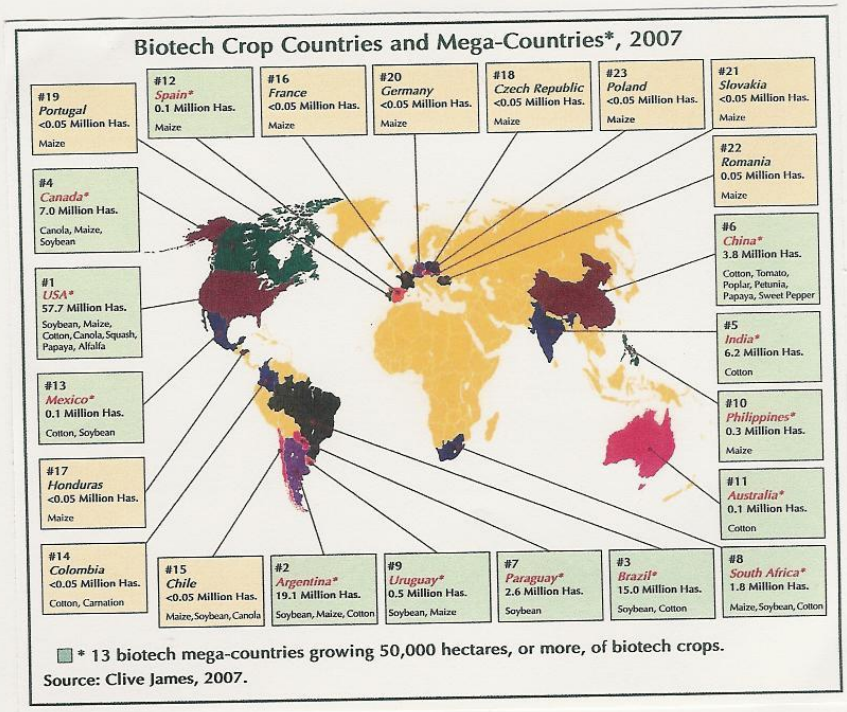
GLOBAL BIOTECH CROPS 2007: TRENDS AND COUNTRIES





ANNEX 5.2

Calculation of the value of Bt maize yield impact

Harvest year	Total hectares ('1000)	Production ('1000 tons)	% Bt	Bt crop ('1000 tons)	Price / ton	Bt crop value ('1000 Rand)	Bt benefit ('1000 Rands)
	WHITE MAIZE						
2000	2,149	6,681	-	-	673	-	-
2001	1,562	4,260		-	1,304	-	-
2002	1,722	5,066	0.4	20	1,540	31,207	2,991
2003	2,232	6,366	2.9	185	1,004	185,352	17,764
2004	1,842	5,805	8.0	464	823	382,201	36,630
2005	1,700	6,541	8.2	536	854	458,053	43,900
2006	1,033	4,187	28.8	1,206	1,422	1,714,727	164,341
2007	1,625	4,315	43.8	1,890	1,799	3,400,056	325,864
2008	1,737	6,861	43.0	2,950	1,810	5,339,916	511,782
	SUB-TOTAL			**7,252**			**1,103,273**
	YELLOW MAIZE						
2000	1,281	4,320	0.2	9	691	5,970	572
2001	1,112	3,226	5.3	171	1,168	199,702	19,140
2002	1,174	4,194	14.5	608	1,293	786,312	75,361
2003	953	3,026	19.5	590	1,047	617,803	59,211
2004	1,001	3,677	19.7	724	863	625,130	59,913
2005	1,110	4,909	22.6	1,109	794	880,891	84,425
2006	567	2,431	17.8	433	1,415	612,296	58,683
2007	927	2,810	35.5	998	1,852	1,847,463	177,062
2008	1,062	4,736	40	1,894	1,764	3,341,722	320,273
	SUB-TOTAL			**6,536**			**854,641**
	GRAND TOTAL			**13,788**			**1,957,914**

Source: Prices – University op Pretoria's Bureau for Food and Agricultural Policy

Production data - Crop Estimates Committee

GM adoption data provided by Wynand van der Walt, FoodNCropBio

ANNEX 5.3

GMO ACT 15/2007
APPLICATION FORMS, POLICIES, GUIDELINES

- Guidance document for use by the applicant to complete the application forms
- Application for a non GMO status certificate for export
- Application for commodity clearance of genetically modified organisms
- Application for general release of genetically modified organisms
- Application for intentional introduction (conduct a trial release) of a genetically modified organism
- Application for contained use of genetically modified organisms
- Application for an extended permit (fast track) for activities with GMOs in SA
- Application for authorisation to export LMOs from South Africa that are destined for (i) contained use or (ii) use as food, feed or processing
- Application for authorisation to export LMOs from South Africa that are destined for intentional introduction into the environment
- Application for authorisation to import LMOs into South Africa that are destined for contained use
- Application for authorisation to import LMOs into South Africa that are destined for intentional introduction (trial release) into the environment
- Application for authorisation to import LMOs that have general release and/or commodity clearance status in South Africa
- Application for affidavit to be completed in the presence of a Commissioner of Oaths
- Application to register a facility for activities involving genetic modification
- Application for authorisation to use imported GMOs as food, feed or for processing in South Africa

Policy and guideline documents

- Standard Operating Procedures with regard to regulation 4 of the GMO Act
- GMO Annual Report
- Standard Operating Procedures with regard to regulation 2(2) of the GMO Act
- Guidelines for compiling a public notice in terms of the Genetically Modified Organisms Act, 1997
- Guideline document for work with genetically modified organisms
- Guideline document for use by the Advisory Committee when considering proposals/applications for activities with genetically modified organisms
- Policy on GMO consignments in transit
- Policy on extension of permits
- Terms of reference for subcommittees to assist the Advisory Committee in terms of section 11(2) of the Genetically Modified Organisms Act, 1997